7. Cost of Capital

Cost of capital is defined as minimum rate of return that a firm must earn on its investment for market value of the firm to remain unchanged. Cost of capital is the minimum required rate of return on funds committed to the project so that market value of firm not fall in the market.

> *In the word of **John J. Hampton** "the cost of capital is the rate of return; the firm requires from investment in order to increase the value of firm in the market palace"*
> ***Solomon Ezra** has called it the minimum required rate of return or cut off rate for capital expenditure.*

In other word cost of capital separate into two words Capital and cost.

Capital	Cost
Equity Share Capital	Dividend (K_e)
Preference Share Capital	Dividend (K_p)
Retain Earning	Dividend (K_r)
Debenture	Interest (K_d)
Term Loan Bank and Financial Institution	Interest (K_d)

Therefore, cost of capital is the rate which an organization must pay to the suppliers of capital for their use of funds. Such as company pay dividend to equity shareholders, preference shareholders and pay interest to debenture holders, Bank and financial institutions.

Cost of capital also called **Borrowing and lending rate**. ***Borrowing rate means** the rate of interest which must be paid to obtain and use of capital. **Lending rate** is the rate which the firm discounts its profit. Cost of capital is to be determined to help in managerial decision making such as acceptance of capital, investment, appraisal of profitability, restructuring of capital etc.*

Cost of capital is minimum rate of return which consists of **risk free return plus premium for risk associate with particular business**. The risk of business can be categories

(a) Business Risk

(b) Financial Risk

***Business Risk** measure the variability in operating profit (EBIT) due to change in sales. Financial risk arises when the firm depends more on debt funds.* Therefore, business risk and financial risk are associated with particular firm called a premium risk.

Cost of capital consists of following three components :

- *Risk cost of a particular type of financing (R_j)*
- *Business risk premium (b)*
- *Financing risk premium (f)*

Cost of capital (k) = risk cost of a particular financing + Business risk + Financing risk

$$K = R_j + b + f$$

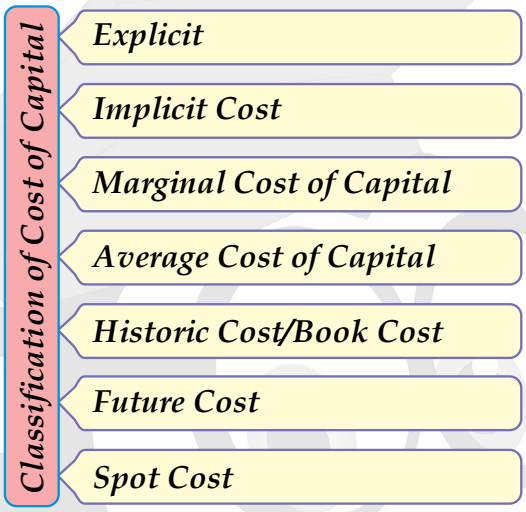
Significance of Cost of Capital

Evaluating Investment Decision : In NPV and IRR method use cost of capital for accepting or rejecting of investment decision. It is also known as the **Cutoff rate or hurdle rate**.

Designing Capital Structure : When designing of capital structure of firm, the management has to consider the objective of maximum value of firm and minimize cost of capital.

Appraising the Financial Performance of Top Management : It is used of appraising the financial performance of top management with comparison of actual profitability of the investment by the firm with the projected overall cost of capital.

Classification of Cost of Capital



Assumption of Cost of Capital

The financial and business risks are not affected by investing in new investment proposal.

The firm's capital structure remains unchanged. Cost of each sources of capital is determined on an after-tax basis.

Determining Components Costs of Capital

1. Cost of Debts (K_d)

Debt may be in form of debenture, bonds, term loan from financial institution and bank etc. The cost of debt is defined as fixed rate of interest payable to bank, financial institution, irrespective of the profitability of the company.

Debenture can be issued :

- At Par
- At Premium
- At Discount

Cost of Debentures or Bonds

Focus Formula

$$K_d\ (before\ tax) = \frac{R + \left[\frac{MV - NP}{n}\right]}{\left[\frac{MV + NP}{2}\right]} \times 100$$

Where K_d = Cost of Debt
MV = Maturity Value of Debt
NP = Net Proceeds
n = Number of years to maturity
R = Annual interest Payment.
K_d (after tax) = K_d (before tax) × (1 – T)

or

$$K_d\ (\text{after tax}) = \frac{(1-T)\left[R + \left(\frac{MV - NP}{n}\right)\right]}{\left[\frac{MV + NP}{2}\right]} \times 100$$

Cost of Irredeemable or Perpetual Debt

$$K_d\ (\text{after tax}) = \frac{R}{NP} \times (1-T)$$

where K_d = Cost of Debt
R = Interest
NP = Net Proceeds
T = Tax Rate

For Example

A company issues 12% debentures of Rs. 5,00,000 repayable after 10 years **at a discount of 4%** and incurs Rs. 10,000 for underwriting, brokerage etc., then, the cost of debt capital will be :

$$K_d = \frac{\text{Rs. } 60,000 + \left(\frac{\text{Rs. } 5,00,000 - \text{Rs. } 4,70,000}{10}\right)}{\left(\frac{\text{Rs. } 5,00,000 + \text{Rs. } 4,70,000}{2}\right)} \times 100$$

$$= \frac{\text{Rs. } 60,000 + \text{Rs. } 3,000}{\text{Rs. } 4,85,000} \times 100$$

$$= \frac{\text{Rs. } 63,000}{\text{Rs. } 4,85,000} \times 100 = 13\% \text{ (Approximately)}$$

If the **debentures are issued at par** and there is no floatation cost, the cost of debt capital as calculated by the above formula will be equal to the contractual rate of interest as verified below :

$$K_d = \frac{\text{Rs. } 60,000 + \left(\frac{\text{Rs. } 5,00,000 - \text{Rs. } 5,00,000}{10}\right)}{\left(\frac{\text{Rs. } 5,00,000 + \text{Rs. } 5,00,000}{2}\right)} \times 100$$

$$= \frac{\text{Rs. } 60,000 + 0}{\text{Rs. } 5,00,000} \times 100 = 12\%$$

If debentures are issued at premium and redeemed at par on maturity.

For example, if the company issues 12% debentures of Rs. 5,00,000 at a premium of 5% and incurs Rs. 10,000 as issue expenses, redeemable after 10 years at par.the cost of debt capital will be

$$K_d = \frac{\text{Rs. } 60,000 + \left(\frac{\text{Rs. } 5,00,000 - \text{Rs. } 5,15,000}{10}\right)}{\left(\frac{\text{Rs. } 5,00,000 + \text{Rs. } 5,15,000}{2}\right)} \times 100$$

$$= \frac{\text{Rs. } 60,000 - \text{Rs. } 1,500}{\text{Rs. } 5,07,500} \times 100$$

$$= \frac{\text{Rs. } 58,500}{\text{Rs. } 5,07,500} \times 100 = 11.53\%$$

If debentures are redeemable at premium.

For example, if the company issues 12% debentures of Rs. 5,00,000 at per redeemable after 10 years at premium of 5% and incurs Rs. 10,000 as issue expenses, the cost of debt capital will be

$$K_d = \frac{\text{Rs. } 60,000 + \left(\frac{\text{Rs. } 5,25,000 - \text{Rs. } 4,90,000}{10}\right)}{\left(\frac{\text{Rs. } 5,25,000 + \text{Rs. } 4,90,000}{2}\right)} \times 100$$

$$= \frac{\text{Rs. } 60,000 + \text{Rs. } 3,500}{\text{Rs. } 5,07,500} \times 100$$

$$= \frac{\text{Rs. } 63,500}{5,07,500} \times 100 = 12.51\%$$

2. Cost of Preference Share (K_p)

In case of preference share capital payment of dividends is not legally binding on the firm. Like interest of debenture, yet these can be issued only when there is a possibility of paying dividend. Therefore, dividend expected by preference share holder. This dividend is cost of preference share for company.

Cost of Irredeemable Preference Share Capital

Focus Formula

$$K_p = \frac{DPS}{NP} \times 100$$

where K_p = Cost of Preference Share Capital
DSP = Dividend Payable per Pref. Share
NP = Net Proceeds

Cost of Redeemable Preference Share Capital

Focus Formula

$$K_p = \frac{D + \left[\frac{MV - NP}{n}\right]}{\left[\frac{MV + NP}{2}\right]} \times 100$$

where MV = Maturity Value of preference share
NP = Net Proceeds
n = Number of years to maturity
D = Dividend per share

For example, if the company issues 12% Preference shares of Rs. 5,00,000 at par and incurs Rs. 10,000 as issue expenses, the cost of debt capital will be :

$$K_d = \frac{\text{Rs. } 60,000}{\text{Rs. } 4,90,000} \times 100 = 12.24\%$$

R = 5,00,000 × 12% = Rs. 60,000

NP = Rs. 5,00,000 - 10,000 = Rs. 4,90,000

Example : Y Ltd issues 50,000 on 10% preference shares of Rs. 100 each redeemable after 10 years at a premium of 5%. The cost of issue is Rs. 2 per share, then the cost of preference share capital will be :

Solution :

$$K_p \text{ (after tax)} = \frac{D + \left(\frac{MV - NP}{n}\right)}{\left(\frac{MV + NP}{2}\right)} \times 100$$

$$= \frac{\text{Rs.}10 + \left(\frac{\text{Rs. } 105 - 98}{10}\right)}{\left(\frac{\text{Rs. } 105 + \text{Rs. } 98}{2}\right)} \times 100$$

$$= \frac{\text{Rs. } 10 + \text{Rs. } 0.70}{\text{Rs. } 101.50} \times 100 = 10.54\%$$

$$K_p \text{ (before tax)} = K_p \text{ (after tax)} \times \frac{1}{(1 - T)}$$

$$= 10.54 \times \frac{1}{(1 - 0.50)}$$

$$= 10.54 \times 2 = 21.08\%$$

Ques. *Which of the following formula is used for calculating the cost of preference share capital ?*

(NTA UGC-NET Aug. 2016 P-II)

(A) $\dfrac{\text{Preference Dividend}}{\text{Market Price of Preference Share}} \times 100$

(B) $\dfrac{\text{Preference Dividend}}{\text{Net proceeds Preference Share}} \times 100$

(C) $\dfrac{\text{Net proceeds from preference share}}{\text{Preference Share capital}} \times 100$

(D) $\left(\dfrac{\text{Preference Dividend}}{\text{Net Proceeds from Pref. Share}} \times 100\right)$

Ans. *(B)* $\dfrac{\text{Preference Dividend}}{\text{Net proceeds Preference Share}} \times 100$

3. Cost of Equity Share Capital (K_e)

Equity share is permanent source of fund. The equity shareholders are considered to be owner of the company. The cost of equity may be defined as the minimum rate of return that a company must earn on equity share capital. Equity shareholders do not have a fixed rate of return on their investment. There is no legal binding to pay regular dividends to them.

The following method are used in calculation of cost of equity :

(a) Dividend Yield Method :

Focus Formula

$$K_e = \frac{DPS}{MP} \times 100$$

where K_e = *Cost of Equity Capital*
DPS = *Dividend Per Share*
MP = *Market Price Per Share*

For example, if a company issues 3,00,000 equity shares of Rs. 10 each and the current market price of these shares is Rs. 15 per share. If the company has paid dividend at the rate of Rs. 1.20 per share, the cost of equity share capital would be-

$$K_e = \frac{\text{Rs. } 1.20}{\text{Rs. } 15} \times 100 = 8\%$$

(b) Earning Yield Method :

Focus Formula

$$K_e = \frac{EPS}{MP} \times 100$$

where K_e = *Cost of Equity Capital*
EPS = *Earning Per Share*
MP = *Market Price Per Share*

For example, a company issues 5,00,000 equity shares of Rs. 10 each and earned a profit of Rs. 6,00,000 after tax. If the market price of these shares is Rs. 16 per share, the cost of capital will be :

$$K_e = \frac{1.20}{16} \times 100 = 7.5\%$$

EPS = Rs. 6,00,000 ÷ 5,00,000 = Rs. 1.20

(c) Dividend Yield and Growth in Dividend Method :

Focus Formula

$$K_e = \frac{DPS}{MP} \times 100 + G$$

where K_e = Cost of Equity Capital
DPS = Dividend Per Share
MP = Market Price Per Share
G = Growth Rate in Dividend

For example, the present market price of a company's equity share is Rs. 60 and dividend per share is Rs. 4.50. If the 7% p.a. growth in the dividend is expected, then cost of capital would be-

$$K_e = \frac{\text{Rs. } 4.50}{\text{Rs. } 60} \times 100 + 7 = 7.5 + 7 = 14.5\%$$

(d) Newly Issued Equity Share :

Focus Formula

$$K_e = \frac{DPS}{NP} \times 100 \quad or \quad \frac{EPS}{NP} \times 100 \quad or \quad \frac{DPS}{NP} \times 100 + G$$

where NP = Net Proceeds

For example, a company issues 50,000 equity shares of Rs. 10 each at a premium of 20% and the company pays underwriting commission at 5% on issue price. If the rate of dividend expected by the shareholders is Rs. 2.5 per share, the cost of equity share capital would be-

$$K_e = \frac{DPS}{NP} \times 100$$

$$= \frac{\text{Rs. } 2.50}{\text{Rs. } 11.40} \times 100 = 22\%$$

Where; DPS = Dividend per share

NP = Net proceeds per share

$$= \text{Rs. } 10 + 2\left(10 + \frac{20}{100}\right) - 5\% \text{ commission}$$

= 12 – 0.60 = Rs. 11.40

Ques. *From investor's point of view, the cost of capital is :* ***(NTA UGC-NET Dec. 2015 P-III)***

(A) *Interest Rate* *(B)* *Market Value*

(C) *Yield of Capital Sacrifice* *(D)* *Stock Exchange Value*

Ans. *(C)* *Yield of Capital Sacrifice*

Ques. *Indicate the correct combinations of methods for determining the cost of equity capital from the following :* ***(NTA UGC-NET Aug. 2016 P-III)***

(i) *Earnings yield method* *(ii)* *Operating income yield method*

(iii) *Dividend yield method* *(iv)* *Dividend yield and growth method*

(A) *(i), (ii), (iii)* *(B)* *(ii), (iii), (iv)*

(C) *(i), (ii), (iv)* *(D)* *(i), (iii), (iv)*

Ans. *(D)* *(i), (iii), (iv)*

4. Cost of Retain Earning (K_r)

Many companies do not distribute the entire profit in form of dividend. Some part of profit is retained for future expansion. But neither the company pays any cost nor incurs any expenditure for such funds therefore it is assumed to be cost free capital but some expenses such as brokerage, commission, tax may have incurred towards purchasing securities so we adjust these type expenses during calculating retain earning. In absence of information regarding tax on income earnings.

Focus Formula

$$K_r = K_e(1 - T_p)(1 - B)$$

or $$K_r = \frac{D(1 - T_p)(1 - B)}{MP} \times 100$$

or $$K_r = \frac{E(1 - T_p)(1 - B)}{MP} \times 100$$

where K_r = Cost of Retained Earnings

D or E = Shareholders expected rate of Dividend or Earnings per share

MP = Market Price per share

T_p = Personal income tax rate of shareholders

B = Brokerage

Example : Calculate the cost of retained earnings from the following information :

Current market price of a share Rs. 140

Cost of flotation/brokerage per share 3% on market price

Growth in expected dividend 5%

Expected dividend per share on new shares Rs. 14

Shareholders marginal/personal income tax 22%.

Solution :

$$K_r = \left(\frac{DPS}{MP} \times 100 + G\right)(1 - T_p)\ (1 - B)$$

$$= \left(\frac{Rs.\ 14}{140} \times 100 + 5\%\right)(1 - 0.22)(1 - 0.03)$$

= (10% + 5%) (0.78) (0.97)

= 15% × 0.78 × 0.97

= 11.35%

Ques. *Which one is more appropriate for cost of retained Earnings ?*

(NTA UGC-NET Dec. 2012 P-II)

(A) *Weighted Average Cost of Capital.*

(B) *Opportunity cost to the firm.*

(C) *Expected rate of return by the investor.*

(D) *None of the above*

Ans. *(B)* *Opportunity cost to the firm.*

5. Weighted Average Cost of Capital (K_w)

A firm may procure long term funds from various sources like equity share capital, preference share capital, debenture, term loan. When all these cost of different forms of long term funds are weighted by their relative proportions to get overall composite cost of capital, these are termed as weighted average cost of capital.

In financial decision making the cost of capital should be calculated on after tax basis.

> *"**CIMA London defines** the weighted average cost of capital "as the average cost of the company's finance (equity, debenture, bank loan) weighted to the proportion each element bears to the total pool of capital, weighted is usually based on market valuations current yields and cost after tax."*

Weighted Average Cost of Capital

Focus Formula

$$K_w = \frac{\Sigma WX}{\Sigma W}$$

where K_w = *Weighted Average Cost of Capital*

X = *Cost of different components of capital*

W = *Weights (books value or market value) assigned to different sources of capital.*

Weighted average cost of capital can be either 'book value weights' or 'market value weight'

Example : Calculate weighted average cost of capital from the following information :

	Rs.
4,000 Equity Shares (fully paid up)	4,00,000
3,000 6% Debentures	3,00,000
2,000 6% Preference Shares	2,00,000
Retained Earnings	1,00,000

Earnings per equity share has been Rs. 10 during the past year and equity shares are being sold in the market at par. Assume corporate tax at 50 per cent and shareholders' personal tax liability 10%.

Solution :

(A) Specific cost of Various Components of Capital

(i) Cost of Equity Share Capital

$$K_e \text{ (after tax)} = \frac{EPS}{MP} \times 100 = \frac{10}{100} \times 100 = 10\%$$

(ii) Cost of Retained Earnings

$$K_r \text{ (after tax)} = \frac{E(1 - T_p)}{MP} \times 100$$

$$= \frac{10 \times (1 - 0.10)}{100} \times 100 = 9\%$$

(iii) Cost of Preference Share Capital

$$K_p \text{ (after tax)} = \frac{DPS}{NP} \times 100 = \frac{6}{100} \times 100 = 6\%$$

(iv) Cost of Debentures

$$K_d \text{ (after tax)} = \frac{R}{NP} \times 100 \ (1 - T)$$

$$= \frac{6}{100} \times 100 \ (1 - 0.50)$$

$$= 6 \times 0.50 = 3\%$$

(B) Computation of Weighted Average Cost of Capital

Source	Amount Rs.	Weights	Cost of Capital	Weighted Average Cost
(1)	(2)	(3)	(4)	(5) = (3) × (4)
Equity Share Capita	4,00,000	0.4	0.1	0.04
Debentures	3,00,000	0.3	0.03	0.009
Pref. Share Capital	2,00,000	0.2	0.06	0.012
Retained Earnings	1,00,000	0.1	0.09	0.009
Weighted Average Cost of Capital				**0.070 or 7%**

Ques. *Which one of the following is not the internal factor affecting the weighted average cost of capital of a firm ?* ***(NTA UGC-NET Dec. 2013 P-II)***

(A) Investment policy of the firm *(B) Capital structure of the firm*

(C) Dividend policy followed *(D) Market risk premium for the firm*

Ans. *(D)*

Ques. Assertion (A) : *Weighted average cost of capital should be used as a hurdle rate for accepting or rejecting a capital budgeting proposal.*

Reason (R) : *It is because by financing in the proportions specified and accepting the project, yielding more than the weighted average required return, the firm is able to increase the market price of its stock.* ***(NTA UGC-NET June 2014 P-II)***

(A) *Both (A) and (R) are false.* *(B)* *Both (A) and (R) are true.*

(C) *(A) is true, while (R) is false.* *(D)* *(A) is false, while (R) is true.*

Ans. *(B)*

6. Capital Assets Pricing Model (CAPM)

CAPM is also used in valuation of share. It is explained how assets prices are formed in the market place. CAPM is equilibrium model of the trade-off between expected portfolio return and systematic risk, basiscally this theory links risk and return of all assets.

CAPM require following information

- The expected risk-free rate of return
- The expected risk premium
- Beta

CAPM is calculated according to the following formula :

Focus Formula

$$Ra = Rrf + [Ba \times (Rm - Rrf)]$$

where Ra = *Expected return on a security*

Rrf = *Risk-free rate*

Ba = *Beta of the security*

Rm = *Expected return on market*

Note : *Risk Premium* = $(Rm - Rrf)$

Example : Nokia Mobile Corporation has a beta coefficient of 0.88. Estimate its cost of equity if the risk free rate is 4% and return on the broad market index is 8%

Solution : Under Capital Asset Pricing Model

Cost of equity = risk free rate + beta coefficient × equity risk premium

Equity risk premium = broad market return – risk free rate

Cost of equity = risk free rate + beta coefficient × (broad market return – risk free rate)

Cost of equity = 4% + 0.88 × (8% – 4%) = 4% + 0.88 × 4% = 7.52%

Ques. *Which one of the following is the most popular method for estimating the cost of equity ?* ***(NTA UGC-NET Dec. 2013 P-II)***

(A) *Capital asset pricing model* *(B)* *Dividend yield method*

(C) *Gordon's dividend discount model* *(D)* *Earnings yield method*

Ans. *(A)*

Ques. *Indicate the cost of equity capital, based on capital asset pricing model, with the following information :* **(NTA UGC-NET June. 2014 P-III)**

Beta coefficient – 1.40

Risk-free rate of interest – 9%

Expected Rate of Return on equity in the market – 16%

(A) 9.8% (B) 18%

(C) 18.8% (D) 16%

Ans. (C)

Ques. *Match the items of the following two lists and suggest the correct code :*

	List-I		**List-II**
(a)	Realized yield method	(i)	Cost of equity share capital
(b)	Taxation	(ii)	Cost of equity capital
(c)	Cost of total capital employed	(iii)	Cost of debt capital
(d)	Dividend growth is a consideration	(iv)	Weighted cost of capital

Codes : **(NTA UGC-NET Dec. 2014 P-II)**

	(a)	**(b)**	**(c)**	**(d)**
(A)	(iv)	(iii)	(ii)	(i)
(B)	(ii)	(iv)	(i)	(iii)
(C)	(ii)	(iii)	(iv)	(i)
(D)	(i)	(ii)	(iii)	(iv)

Ans. (C) (ii) (iii) (iv) (i)

Ques. *Which of the following statements is not correct ?* **(NTA UGC-NET Jan. 2017 P-II)**

(A) *The cost of capital is required rate of return to ascertain the value of the firm.*

(B) *Different sources of funds have a specific cost of capital related to that source only.*

(C) *Cost of capital does not comprise any risk premium.*

(D) *Cost of capital is basic data for NPV technique.*

Ans. (C) *Cost of capital does not comprise any risk premium.*